

09/756,832

applying a loading force to drive the shearing element away from its home position to which it is urged by an adjustable mechanical biasing force into a loading position,

AI loading the assembly of the substrate and the semiconductor device into the fixture with the shearing element proximate to the semiconductor device,

removing the loading force to apply a shearing force derived from the adjustable mechanical biasing force and applied by the shearing element to the semiconductor device, and

heating the solder connections of the assembly in the fixture to a predetermined temperature.

A2 7. (Amended) A method for removing a circuit chip from a substrate in a fixture having a shearing element where the chip is secured to a substrate by bonding elements, comprising:

applying a loading force to move the shearing element from a mechanically biased home position into a loading position against an adjustable biasing force,

then loading the substrate with the chip onto the fixture,

removing the loading force to arm the shearing element into a position in contact with the chip, so the adjustable biasing force is applied by the shearing element to the semiconductor device, and

FIS920000300US1**-2-**

09/756,832

A2 heating the assembly located in the fixture to a predetermined temperature until shearing of the bonding elements occurs while continuously applying the mechanical force with the shearing element.

A3 16. (Amended) Apparatus for separating at least one semiconductor device from at least one substrate where the at least one semiconductor device is attached to the at least one substrate by solder connections to form an assembly, comprising:

a biasing element for applying a loading force to drive a shearing element away from its home position to which it is urged by an adjustable mechanical biasing element into a loading position under a fixture,

a loading element for placing the assembly of the substrate and the semiconductor device into a fixture with a window therethrough for the semiconductor device with the shearing element in contact with the semiconductor device and armed for shearing the semiconductor device from the substrate.

17. (Amended) The apparatus of claim 16 wherein the shearing element comprises a slidable blade.

FIS920000300US1**-3-**

09/756,832

B3 18. (Amended) The apparatus of claim 16 wherein the shearing element is a blade affixed to a slidable element that is connected by a linkage to a coil spring which applies the biasing force thereto.

19. (Amended) Apparatus for removing a circuit chip from a substrate where the chip is secured to a substrate by bonding elements, comprising:

a biasing element for applying a loading force to move a shearing element from a mechanically biased home position into a loading position under a fixture against an adjustable biasing force,

a loading element for placing the substrate with the chip onto the fixture, and

a retaining element for holding the shearing element in a position in contact with the chip, so the biasing force is applied by the shearing element to the semiconductor device.

Add new claims 28 to 32 as follows:

A4 28. The method of claim 1 further comprising the step between applying a loading force and removing the loading force of adjusting the adjustable mechanical biasing force to a predetermined biasing force.

FIS920000300US1**-4-**

09/756,832

29. The method of claim 7 further comprising the step between applying a loading force and removing the loading force of adjusting the adjustable biasing force to a predetermined biasing force.

AY
30. The apparatus of claim 16 wherein the adjustable mechanical biasing element comprises a coil spring and further comprising an adjustable element for adjusting the bias applied by the coil spring.

31. The apparatus of claim 16 wherein the apparatus is for separating a plurality of semiconductor devices from a plurality of substrates and further comprising:

additional adjustable mechanical biasing elements, shearing elements and windows for separating a semiconductor device from each of a plurality of substrates wherein there is a one to one correspondence between adjustable mechanical biasing elements, shearing elements and windows and wherein each adjustable mechanical biasing element is adjusted according to each semiconductor device to be sheared from each substrate.

FIS920000300US1

-5-

09/75 ,832

32. Apparatus for separating a semiconductor device from each of a plurality of assemblies comprising a semiconductor device and a substrate, the apparatus comprising:

A4
a fixture having (i) a plurality of windows in side-by-side relation, each of said windows adapted to receive an assembly with the semiconductor device facing downwardly, (ii) a plurality of adjustable biasing elements, and (iii) a plurality of shearing elements connected to the plurality of adjustable biasing elements for separating the semiconductor device from the substrate, wherein said windows, adjustable biasing elements and shearing elements are associated with one another in a one to one correspondence; and

a loading apparatus for applying a loading force to move a shearing element from a biased home position into a loading position against an adjustable biasing force from the adjustable biasing element;

wherein, in operation, the loading apparatus is actuated to move a shearing element from the home position into the loading position, an assembly is placed semiconductor device down into a window and the loading apparatus is deactuated so that the adjustable biasing element moves the shearing element to its home position where it exerts a biasing force against the semiconductor device; and

FIS920000300US1

-6-